

## *Rhinophylla pumilio.*

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### ***Rhinophylla* Peters, 1865**

*Rhinophylla* Peters, 1865:355. Type species *Rhinophylla pumilio* Peters, 1865, by monotypy.

**CONTEXT AND CONTENT.** Order Chiroptera, suborder Microchiroptera, family Phyllostomidae, tribe Stenodermatini (Baker et al. 1989, 2000), subfamily Carollinae, genus *Rhinophylla*. The genus *Rhinophylla* includes 3 species, *R. alethina* Handley, 1966, *R. fischerae* Carter, 1966, and *R. pumilio* Peters, 1865. Key to species follows (Albuja 1999; Carter 1966; Handley 1966; Tirira 1999):

1. Interfemoral membrane narrow, <5 mm at midline; calcar short, <3.5 mm; cutting edge of II entire; west of Andes Mountains ..... *R. alethina*
- Interfemoral membrane well developed, >5 mm at midline; calcar to 5 mm; cutting edge of II notched; east of Andes Mountains ..... 2
2. Posterior edge of interfemoral membrane naked; no diastema between I2 and superior canine; II with lateral cingular style ..... *R. pumilio*
- Posterior edge of interfemoral membrane fringed with obvious, stiff hairs; diastema between I2 and superior canine; II without lateral cingular style ..... *R. fischerae*

### ***Rhinophylla pumilio***

Dwarf Little Fruit Bat

*Rhinophylla pumilio* Peters, 1865:355. Type locality, “angeblich Brasilien” (ostensibly Brazil). Restricted to “Brazil (Bahia)” (Dobson 1878:496).

*Rhynophylla cumilis* Kappler, 1881:163. Type locality, “Suriname.”

**CONTEXT AND CONTENT.** Context as for genus. *R. pumilio* is monotypic (Koopman 1994). The species name *cumilis* is attributed to Peters, but no record of *R. cumilis* exists and it may be a misspelling of *R. pumilio* (Husson 1978).

**DIAGNOSIS.** *Rhinophylla pumilio* (Fig. 1) may be confused with members of the sister genus *Carollia*, but can be easily distinguished by *R. pumilio*’s absence of tail, reduced uropatagium (<10 mm at center—Tirira 1999), and unique configuration of protuberances on chin (Husson 1978; Wetterer et al. 2000). In *Carollia*, a large circular central chin protuberance is bordered by 2 rows of smaller circular protuberances that meet ventrally, forming a “V” (Cloutier and Thomas 1992). In *Rhinophylla*, central protuberance is triangular and bordered by 2–6 elongated fleshy pads (Dobson 1878; Handley 1966; Husson 1978). P1 is much smaller than P2 in *R. pumilio*; P1 and P2 are ca. equal in size in *Carollia* (Albuja 1999; Miller 1907). *R. pumilio* also may be confused with smaller members of the genus *Sturnira*, but is reliably diagnosed by presence of conspicuous interfemoral membrane and absence of zygomatic arch in *R. pumilio* (Fig. 2).

*Rhinophylla pumilio* usually can be distinguished from other *Rhinophylla* species by form of incisors. In *R. pumilio* and *R. fischerae*, upper medial incisor is notched on cutting edge, whereas in *R. alethina* cutting edge is uninterrupted. Upper medial incisor in *R. pumilio* possesses a distinct lateral cingular style, which is absent in *R. alethina* and *R. fischerae*. A diastema between upper lateral incisor and upper canine is present only in *R. fischerae* (Carter 1966; Handley 1966).

*Rhinophylla pumilio* is further distinguished by absence of conspicuous, stiff hairs along distal edge of uropatagium, as found in *R. fischerae*. *R. alethina* is generally larger (length of forearm,

34.9–37.2 mm—Albuja 1999; Handley 1966) than *R. pumilio* (length of forearm, 29.9–37 mm), with a more reduced uropatagium (<5 mm at center), and shorter calcar (3.5 mm versus 5 mm). In comparison to *R. pumilio*, *R. alethina* is generally more hirsute, and color of lips, ears, and membranes is darker, more blackish (Handley 1966). *R. alethina* has a low sagittal crest, which is absent in *R. pumilio* (Handley 1966).

**GENERAL CHARACTERS.** *Rhinophylla pumilio* is a small fruit-eating bat. Dorsal color is uniformly olive-brown to reddish brown. Venter is uniformly drab with basal portion of hairs on dorsum and venter whitish. Color of wings is dark to blackish, sharply contrasting with whitish metacarpals and phalanges (Husson 1962, 1978). Ears are pinkish brown, rounded, and shorter than head (Albuja 1999; Charles-Dominique et al. 2001). The angularly emarginated interfemoral membrane is moderately developed and extends to middle of tibia (Dobson 1878). Wing extends to metatarsals, just proximal to base of outer toe (Dobson 1878). No external tail is present. Tragus of ear is small and broad, extending ca. one-third length of ear (Husson 1978). Calcar is distinct, up to 5 mm in length, but <50% length of foot (Dobson 1878). Spearlike nose leaf is well developed with length ca. 2 times width (Dobson 1878) and, when flattened, reaches well beyond eye to center of forehead (Emmons and Feer 1997).

Medial upper incisors are notched and much larger than pointed outer incisors. Lower incisors strongly contrast in size, with me-



FIG. 1. Adult male *Rhinophylla pumilio* from Tiputini Biodiversity Station, 95 km E Puerto Francisco de Orellana, Orellana Province, Ecuador. Photograph by J. Benjamin Rinehart.



FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of an adult female *Rhinophylla pumilio* from Oxapampa Province, Pasco, Peru (MCZ [Harvard University, Museum of Comparative Zoology] 59948). Greatest length of skull is 28.9 mm. Photographs by J. Benjamin Rinehart.

dial being much larger and possessing a trilobed cutting edge in contrast to smaller bilobed lateral pair (Husson 1962). Two lower premolars are similar in form to 3 lower molars (Miller 1907). Descriptions of tooth cusp patterns are available (Dobson 1878; Miller 1907).

Combined ranges of adult external and cranial measurements (in mm) for 121 females and 86 males from Brazil, Colombia, Ecuador, French Guiana, Peru, Suriname, and Venezuela are: length of head and body, 40–57; length of ear from notch, 13–16; length of forearm, 29.9–37.0; greatest length of skull, 16.6–21.4; zygomatic breadth, 9.27–10.04; postorbital breadth, 4.0–5.7; mastoid breadth, 8.76–9.5; breadth of braincase, 8–8.76; depth of braincase, 7.4–8.0; length of maxillary toothrow, 4.6–5.4; breadth across molars, 5.92–6.55 (Albuja 1999; Ascorra et al. 1993; Brosset and Charles-Dominique 1990; Carter 1966; Hill 1964; Husson 1962, 1978; Marinkelle and Cadena 1972; Simmons and Voss 1998; Williams and Genoways 1980). Adult body mass ranges from 7 to 13.5

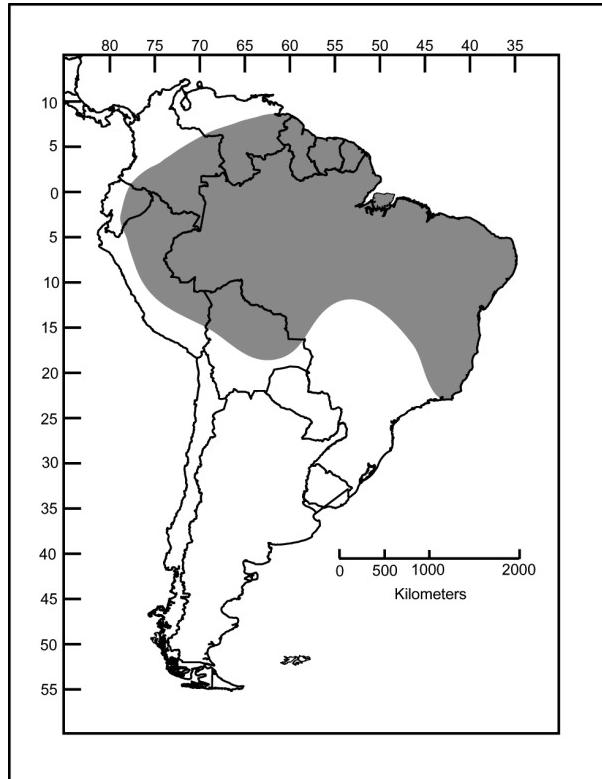


FIG. 3. Geographic distribution of *Rhinophylla pumilio*. Map based on the works of Albuja (1999), Eisenberg (1989), and Eisenberg and Redford (2001).

g. Females are slightly larger, on average, for most measurements. Mean values and detailed measurements for males and females are available (Albuja 1999; Simmons and Voss 1998; Williams and Genoways 1980). Collections from the Guianas typically fall at low end of known range of size variation (Simmons and Voss 1998).

**DISTRIBUTION.** *Rhinophylla pumilio* occurs in Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela (Eisenberg 1989; Eisenberg and Redford 2001; Fig. 3). It occurs at elevations from ca. 10 to 1,400 m (Handley 1976; Simmons and Voss 1998). No fossils are known.

**FORM AND FUNCTION.** Dental formula is i 2/2, c 1/1, p 2/2, m 3/3, total 32 (Husson 1962, 1978; Miller 1907). Ovarian ligament extends from ovary to lateral border of common uterine body (Hood and Smith 1982, 1983). Uterus is simplex. Basal metabolic rate is 1.96 ml O<sub>2</sub>/min and body temperature is 34.7°C (McManus 1977).

Ratio of brain weight to body weight of *R. pumilio* is 0.04 (Baron et al. 1996). Brain of *R. pumilio* has pseudotemporal lobes angled ventrally and very large, distinct inferior and superior olfactory nuclei (McDaniel 1976). Amygdalae and hippocampi also are large, as are superior vestibular nuclei and 2 auditory structures: nucleus cochlearis ventralis and complexus olivaris superior (Baron et al. 1996). Measurements of brain structures are available (Baron et al. 1996).

**REPRODUCTION.** Pregnant females have been captured in March and July (Brazil—Reis and Peracchi 1987); May and July (Colombia—Wilson 1979); July, August, September, and November (Peru—Graham 1987); and December (Venezuela—Wilson 1979). Lactating females were captured in August (Brazil—Reis and Peracchi 1987); April, June, and December (Colombia—Wilson 1979); June (Ecuador—Webster and Jones 1984); and December (Venezuela—Wilson 1979). Litter size is typically 1.

**ECOLOGY.** *Rhinophylla pumilio* is generally common throughout its range and is often among the most abundant bat species locally (Bernard 2001; Brosset et al. 1996; Cockle 2001; Cosson et al. 1999; De Faria 2002; Simmons and Voss 1998). In

French Guiana, *R. pumilio* is usually found in primary and mature secondary lowland forest (Cosson et al. 1999), although individuals are occasionally captured in anthropogenic clearings within primary forest and in closed canopy secondary forest (Simmons and Voss 1998). In Venezuela, *R. pumilio* inhabits moist evergreen forest; individuals also have been captured in pastures and orchards and rarely in deciduous forest (Handley 1976). In southeastern Brazil, *R. pumilio* tolerates forest disturbance and is found in only slightly lower abundance in early secondary forest than in primary forest (De Faria 2002; Zortea 1995). In Amazonian Brazil, *R. pumilio* inhabits a wide variety of habitats including primary forest, forest fragments, and savanna (Bernard and Fenton 2002; Bernard et al. 2001). In Brazil and Peru, individuals have been captured in banana, cacao, and papaya plantations contiguous with surrounding forest (De Faria 2002; Tuttle 1970). Some populations of *R. pumilio* are sensitive to habitat fragmentation. In French Guiana, *R. pumilio* virtually disappeared when flooding subdivided previously contiguous primary forest into small (40-ha) fragments (Cosson et al. 1999).

*Rhinophylla pumilio* is most often captured near ground level, although individuals are periodically taken in elevated mist nets (Bernard 2001; Charles-Dominique and Cockle 2001; Simmons and Voss 1998). When netting effort is evenly distributed between ground level and canopy level, vertical stratification of captures of *R. pumilio* is less pronounced or insignificant (Bernard 2001; Handley 1967; Kalko and Handley 2001).

Diet of *R. pumilio* is highly variable and primarily consists of small-seeded understory and midcanopy fruits, including, in Amazonian Brazil, *Vismia duckei*, *Vismia guianensis* (Clusiaceae), *Syzygium jambolana* (Myrtaceae), *Piper aduncum* (Piperaceae), and *Solanum rugosum* (Solanaceae)—Reis and Guillaumer 1983; Reis and Peracchi 1987); in French Guiana, *Philodendron billietiae*, *P. duckei*, *P. grandifolium*, *P. guianense*, *P. linnaei*, *P. megalocephalum*, *P. melonii*, *P. ornatum*, *P. pedatum*, *P. placidum*, *P. rudgeanum*, *P. soderstromii*, *P. sphalerum*, *P. squamiferum*, *Rhodospatha venosa* (Araceae), *Schlegelia paraensis* (Bignonaceae), *Aechmea* (Bromiliaceae), *Cecropia obtuse*, *C. sciadophylla*, *Cousapoaa*, (Cecropiaceae), *Sympodia globulifera* (Clusiaceae), *Asplundia brachiphylla*, *A. glandulosa*, *A. heterantha*, *Evodianthus funifer*, *Thacocarpus bisectus* (Cyclanthaceae), *Solanum* (Solanaceae), *Marcgravia cf. coriacea* (Marcgraviaceae), *Siparuna* (Monimiaceae), *Ficus* (Moraceae), *Syzygium jambolana* (Myrtaceae), *Piper aduncum* (Piperaceae), and several other incidental species (Charles-Dominique and Cockle 2001; Cockle 1997, 2001); and in Peru, *Philodendron cuneatum* (Araceae), *Cecropia distachya*, *C. ficifolia* (Cecropiaceae), *Vismia angusta*, *V. macrophylla* (Clusiaceae), and *Marcgravia* (Marcgraviaceae—Ascorra et al. 1989). Most of these records are based on seeds found in feces collected from *R. pumilio* captured in nets; thus, they generally exclude large-seeded fruits, in which seeds are rejected during processing. In French Guiana, seeds from large-seeded fruits collected from beneath roost sites include *Licania canescens*, *L. membranacea* (Chrysobalanaceae), *Sympodia globulifera* (Clusiaceae), *Byrsinima* (Malpighiaceae), and *Siparuna* (Monimiaceae)—Cockle 1997; Charles-Dominique and Cockle 2001). At the Nouragues field station in French Guiana, 57% of seeds detected in fecal samples belonged to Araceae and Cyclanthaceae; *R. pumilio* is considered the primary disperser of seeds of *Philodendron* (Araceae), *Asplundia*, and *Evodianthus* (Cyclanthaceae—Cockle 1997). *R. pumilio* occasionally feeds on pollen of the passionflower *Tetrastylis ovalis* (Passifloraceae), and of other flowering species (Buzato and Franco 1992; Pedro and Passos 1995). Ectoparasites of *R. pumilio* include *Eudusbabezia rhinophylla* (Myobiidae), *Periglischrus hopkinsi*, *P. ramirezi* (Spirurnicidae), and members of the families Macropyssidae, Sarcoptidae, Spirurnicidae, Streblidae, and Trombiculidae (Guerrero 1995, 1996; Fain and Bochkov 2002).

**BEHAVIOR.** *Rhinophylla pumilio* roosts in leaves that are modified to form “tents” (Charles-Dominique 1993; Kunz et al. 1994). In French Guiana, *R. pumilio* occupied “apical” and “bifid” tents (sensu Kunz et al. 1994) constructed from leaves of *Philodendron melonii*, *P. ornatum*, *Rhodospatha latifolia* (Araceae), *Astrocarium sciophilum*, *Atalea ataleoides* (Arecaceae), *Sterculia* (Sterculiaceae), and *Phenakospermum guyannense* (Strelitziaeae—Charles-Dominique 1993; Simmons and Voss 1998). *R. pumilio* was twice observed roosting in altered leaves of what was believed

to be *Musa paradisiaca* (Musaceae) in southeastern Brazil (Zortea 1995) and an individual male was observed roosting in a tent constructed from an unspecified *Philodendron* leaf in Peru (R. Voss, in litt.). *R. pumilio* uses tents as daytime roosts and as night feeding roosts and individuals often change tents every few days (Charles-Dominique 1993). Tents are generally located 1.5–15 m aboveground (Charles-Dominique 1993). *R. pumilio* occasionally roosts in culverts (Marinkelle and Cadena 1972) and thatched roofs (Hutterer et al. 1995). Roosting groups of *R. pumilio* include a single male with up to 3 females (Charles-Dominique 1993; Simmons and Voss 1998).

Nightly activity of *R. pumilio* peaks immediately after dusk and before dawn, with an intervening period of relative inactivity (Cockle 2001; Henry 2005). While commuting and foraging, individuals can cover a linear distance of 1,600–4,750 m in a single night, encompassing an area of 6–15 ha (Charles-Dominique 1993; Cockle 2001; Henry 2005).

**GENETICS.** Karyotype of *R. pumilio* is variable; 6 individuals from Colombia had  $2n = 36$ ,  $FN = 62$ , with 3 pairs of acrocentrics (Baker and Blier 1971). Four individuals from Suriname had  $2n = 34$ ,  $FN = 64$ , with no acrocentrics (Honeycutt et al. 1980). Individuals from an undisclosed location had  $2n = 36$ ,  $FN = 56$  (Baker and Bickham 1980). Males and females do not differ in diploid number or fundamental number. X chromosome is medium sized and metacentric and Y chromosome is small and acrocentric (Baker and Blier 1971). *R. pumilio* has undergone karyotypic megaevolution since diverging from other members of genus (Baker and Bickham 1980; Maltbie 1997). An albino individual is known (Charles-Dominique et al. 2001).

Restriction enzyme digests (Lim and Engstrom 1999) and direct sequencing (Wright et al. 1999) of mitochondrial cytochrome-*b* gene revealed that the 3 species of *Rhinophylla* form a monophyletic clade, separate from *Carollia*. Within the *Rhinophylla* clade, *R. alethina*, *R. fisherae*, and *R. pumilio* can be unambiguously separated (Wright et al. 1999).

Sequence divergence in cytochrome-*b* gene ranged from 0.3% for 2 individuals captured several hundred kilometers apart in Brazil (Ditchfield 2000) to an average of 3.6% between an individual from Peru and 2 individuals from French Guiana (Wright et al. 1999). Variation in cytochrome-*b* endonuclease restriction sites averaged 5% between individuals from Ecuador and French Guiana (Lim and Engstrom 1999).

**REMARKS.** Placement of *Rhinophylla* within Carollinae is debated (Baker et al. 1989, 2000; Honeycutt and Sarich 1987; Hood and Smith 1982, 1983; Lim and Engstrom 1999; Miller 1907; Van Den Bussche 1992; Wright et al. 1999). Based on general appearance (Dobson 1878; Peters 1865), dental similarities (Miller 1907), derived condition of ovarian ligament (Hood and Smith 1982, 1983), and similarities in albumin immunological states (Honeycutt and Sarich 1987), *R. pumilio* has been grouped with *Carollia*. Genetic studies based on chromosomal similarities (Baker et al. 1989, 2000), nuclear ribosomal DNA restriction sites (Van Den Bussche 1992), mitochondrial DNA restriction sites (Lim and Engstrom 1999), mitochondrial cytochrome-*b* gene (Wright et al. 1999), and nuclear recombination-activating gene (*RAG2*)—Baker et al. 2000) failed to support *Rhinophylla* as sister to *Carollia*. A total evidence approach, including morphological and genetic characters (Wetterer et al. 2000), found *Rhinophylla* to be sister to *Carollia*, but support for this relationship was weak.

*Rhinophylla* comes from the Greek *rhino*, meaning nose or snout, and *phyllo*, meaning leaf (Brown 2000). The species name, *pumilio*, derives from the Latin for dwarf or pygmy (Brown 2000). The scientific name likely refers to *R. pumilio*’s overall small size and possession of a nose leaf; however, Peters (1865) gives no etymology in the original species description. Common names for *Rhinophylla pumilio* are dwarf little fruit bat and Peters’ little fruit bat (Wilson and Cole 2000).

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